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FROM: Richard L. Alcorta, MD, FACEP
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RE: EMS High Performance CPR, Improving Cardiac Arrest Success,
EMS Termination of Resuscitation Protocols and EMS
Pronouncement of Death in the Field

This memo is an advanced notice of key protocol changes that will impact your current understanding of the **2012 The Maryland Medical Protocols for Emergency Medical Services Providers**, and the transition issues associated with the **2013 The Maryland Medical Protocols for Emergency Medical Services Providers**. These issues include EMS high performance uninterrupted CPR, cardiac arrests, neuroprotective hypothermia for the return of spontaneous circulation post-arrested patient, EMS termination of resuscitation and the new protocol that will allow EMS providers to formally pronounce death in the field which has been approved by the Chief Medical Examiner and Chief Investigator of DHMH's forensic investigators.

MIEMSS is aware this is a significant change in the health community, nursing home expectations and interface with EMS providers across Maryland. Historically, many patients that did not respond to resuscitative efforts on scene or who had actually expired were transported by EMS with lights and sirens to be pronounced dead upon arrival at the hospital. MIEMSS and EMS operational programs are moving to high performance CPR with high compression density and early defibrillation when indicated. There is national evidence that if there is to be a successful return of spontaneous circulation it will be at the scene of the arrest. CPR performance and resuscitative efforts in the back of a rolling ambulance is not as effective as on-scene resuscitation. Transporting an expired patient with lights and sirens places the public and EMS providers at risk for a motor vehicle crash.

Nursing home facilities need to train their staff to understand these changes in EMS practice, the on-scene resuscitation strategy, transport policy and the legal authority to pronounce death in the

field or residence. The latter should be handled in the same fashion as the expiration of an EMS/DNR or an obviously dead patient. EMS providers identify patients that should have aggressive on-scene resuscitation efforts, those that should be transported, and those that meet the criteria for termination of resuscitation for both medical and traumatic injured patients. When the patient meets the criteria for pronouncement of death, the EMS provider will make that declaration, documenting time, date and will complete a patient care report. The scene expired patient will be turned over to nursing homes to follow their policy or law enforcement to following the law enforcement policy working with the medical examiners offices. Only physicians, nurse practitioners or the medical examiner can sign the death certificate. EMS providers will not be signing the death certificate.

Attached you will find the following:

- **Memo of explanation**
- **General Patient Care (GPC) Protocol
Page 27**
- **Cardiac Emergencies: Cardiac Arrest
Page 52**
- **Pronouncement of Death in the Field
(New 2013)
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- **Termination of Resuscitation (Medical and
Traumatic) (New 2013)
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MEMO OF EXPLANATION

High Performance CPR, Cardiac Arrest success, Termination of Resuscitation and Pronouncement of Death Protocols

Based on American Heart Association's standards, subject matter experts, NAEMSP recommendations, Office of the Chief Medical Examiner, successful examples of integrated community high performance CPR/early defibrillation programs, and the best literature, MIEMSS has modified the 2013 *Maryland Medical Protocols for EMS Providers* and has established a statewide Cardiac Arrest Steering Committee. This memo is to help clarify the current 2012 *Maryland Medical Protocols for EMS Providers* and the transition issues associated with the 2013 *Maryland Medical Protocols for EMS Providers* that pertain to high performance uninterrupted CPR, cardiac arrests, neuroprotective hypothermia for the return of spontaneous circulation post-arrested patient, termination of resuscitation, and the new protocol that will allow EMS providers to formally pronounce death in the field.

What can be implemented before July 1, 2013?

There is clear evidence that continuous, high density, minimally-interrupted CPR, and early defibrillation dramatically improves cardiac arrest survival. On page 27 of the 2012 *Maryland Medical Protocols for EMS Providers*, there is a reference to the 2010 AHA CPR standard for the compression-to-ventilation ratio:

Currently, the 2012 *Maryland Medical Protocols for EMS Providers* states:

ALERT:...RATIO FOR COMPRESSIONS TO VENTILATIONS IS 30:2 (15:2 FOR PEDIATRIC PATIENTS WITH TWO PROVIDERS) UNTIL AN ADVANCED AIRWAY IS IN PLACE. THEN, PERFORM HIGH-QUALITY CONTINUOUS CPR.

In 2013, this will be changed to:

ALERT: ONCE CONFIRMED PULSELESS, HIGH-QUALITY CONTINUOUS CPR WITH FREQUENT PROVIDER ROTATION IS AN ESSENTIAL COMPONENT IN THE SUCCESSFUL RESUSCITATION OF THE ARRESTED PATIENT. THIS MAY BE ACCOMPLISHED THROUGH MANUAL OR MECHANICAL MEANS AS APPROPRIATE. PERFORM CPR WHILE PREPARING FOR RHYTHM ANALYSIS AND DEFIBRILLATION (**NEW '13**)

MIEMSS encourages EMS Operational Programs to establish fire/BLS response teams with assigned roles upon arrival at the scene of a cardiac arrest. Fire/BLS personnel should be in charge of CPR performance and rotation of the EMS provider performing compressions every two minutes. EMS providers can perform a continuous compression rate (adult: 100/minute, Pediatric: 120/minute) with interposed ventilation one every ten compressions. This process will allow for increased density of compressions (compressions per minute) and exceed the current protocol recommendation of 30:2 for adult and 15:2 for pediatrics; this will improve the likelihood of a successful early defibrillation.

With return of spontaneous circulation in the adult patient, several things should be occurring as promptly as possible: appropriate anti-arrhythmic stabilization, initiation of therapeutic neuroprotective hypothermia, performance of 12 lead EKG, and notification and transport to the nearest Cardiac Intervention Center (as 50% of ROSC post Arrest patients have need of the cardiac cath lab).

Implementation of these strategies has been demonstrated by the Howard County Fire and Rescue EMS Operational Program; their cardiac arrest return of spontaneous circulation (ROSC) rate has more than

doubled. This is clear evidence that an integrated cardiac arrest cascade of dedicated response makes a significant difference in outcome.

**Transition in culture and implementation the Maryland Medical Protocols for EMS Provider
on July 1, 2013**

Currently, EMS services and EMS providers are transporting patients that have clearly expired and are not going to be resuscitated in the Emergency Department. This practice places both the public and the EMS service/providers at risk during the transport especially with lights and sirens. Also, today EMS providers are being called upon by law enforcement to “pronounce death” at the scene; based on 2012 protocols, EMS providers do not have clear guidance on criteria for making this declaration (with the exception of the Physician-Directed Termination of Unsuccessful , Non-Traumatic Field Resuscitation and Presumed Dead on Arrival protocols). Both of these protocols have been transformed into two new protocols: Termination of Resuscitation and Pronouncement of Death in the Field protocols. These two new protocols have taken over three years to develop with significant legal review, literature review, Medical and Trauma subject matter experts, review and formal approval by the Chief Medical Examiner and Chief Investigator of DHMH’s forensic investigators. Both of these new protocols will address traumatic- and medical-related deaths and the specific criteria for initiation of these protocols by the EMS provider. This formalization of Termination of Resuscitation and Pronouncement of Death in the Field will lead to expired patients being left in the home or in the nursing home; EMS providers need to handle this in a sensitive and compassionate manner. Many EMS operational programs have dispatched a supervisor or ALS provider trained in death and dying who can support the EMS crew and the family of the arrested patient on scene that is likely to be pronounced dead in the field.

On occasions it is clear that leaving the expired patient at the scene is not the appropriate action (e.g. patient in a public area or families that are not emotionally capable to handle the unexpected death of a loved one). The expired patient in these latter unusual situations should be transported in safe and controlled process to the hospital, explaining the reason for transport to the receiving hospital upon arrival.

The *Maryland Medical Protocols for EMS Providers* pages have been attached for your reference and training of your staff. All EMS providers will be trained in these and all the other 2013 protocol changes though the MIEMSS Learning Management System in the spring.

- (3) With on-line medical consultation.
- c) Administer oxygen as appropriate.
 - (1) Administer oxygen at 12-15 lpm NRB mask to all priority 1 patients (including COPD).
 - (2) Administer oxygen at 12-15 lpm NRB to all priority 2 patients (including COPD) experiencing cardiovascular, respiratory, or neurological compromise.
 - (3) Administer oxygen at 2-6 lpm by nasal cannula or 6-15 lpm mask delivery device to ALL other priority 2 patients and priority 3 patients with no history of COPD.
 - (4) Priority 3 patients, with a history of COPD or patients with chronic conditions, should receive their prescribed home dosage of oxygen. If patients are not on home oxygen, they should receive oxygen at 2-6 lpm nasal cannula or 6 lpm mask delivery device, if indicated.



NEVER WITHHOLD OXYGEN FROM A PATIENT IN RESPIRATORY DISTRESS!

DEVICE	FLOW RATE	CONCENTRATION
Nasal Cannula	2-6 lpm	24-44%
Venturi Mask	Variable	24-50%
Partial Rebreather Mask	6-10 lpm	35-60%
Simple Face Mask	6-10 lpm	35-60%
Pocket Mask	12-15 lpm	50-60%
Non-Rebreather Mask	12-15 lpm	80-100%
Bag-Valve-Mask	12-15 lpm	90-100%

4. Circulation



ONCE CONFIRMED PULSELESS, HIGH-QUALITY CONTINUOUS CPR WITH FREQUENT PROVIDER ROTATION IS AN ESSENTIAL COMPONENT IN THE SUCCESSFUL RESUSCITATION OF THE ARRESTED PATIENT. THIS MAY BE ACCOMPLISHED THROUGH MANUAL OR MECHANICAL MEANS AS APPROPRIATE.

PERFORM CPR WHILE PREPARING FOR RHYTHM ANALYSIS AND DEFIBRILLATION (NEW '13)

a) Assess pulse.



- (1) Patients from birth up to those who have not reached their 12th birthday
 - (a) If pulse is absent, use AED/manual defibrillator or begin CPR.
 - (b) If patient is symptomatic with poor perfusion (unresponsive or responds only to painful stimuli) and pulse is less than 60 bpm:
 - (i) Ventilate for 30 seconds.
 - (ii) If after 30 seconds, the pulse is less than 60 bpm, begin CPR.
 - (c) If pulse greater than 60 bpm, continue assessment.
- (2) Patients 12 year of age or older:
 - (a) If pulse is absent, use AED/manual defibrillator or begin CPR.
 - (b) If pulse is present, continue assessment.
- b) Assess for and manage profuse bleeding.
- c) Assess skin color, temperature, and capillary refill.

H. CARDIAC EMERGENCIES: CARDIAC ARREST

1. Initiate General Patient Care.

2. Presentation

Patient must be unconscious, apneic, and pulseless.



3. Treatment

a) Perform CPR.



HIGH-QUALITY CONTINUOUS CPR WITH FREQUENT PROVIDER ROTATION IS AN ESSENTIAL COMPONENT IN THE SUCCESSFUL RESUSCITATION OF THE ARRESTED PATIENT. THIS MAY BE ACCOMPLISHED THROUGH MANUAL OR MECHANICAL MEANS AS APPROPRIATE.

PERFORM CPR WHILE PREPARING FOR RHYTHM ANALYSIS AND DEFIBRILLATION.

(NEW '13)

b) Utilize AED as appropriate.

c) Transport

(1) If no shock indicated, consider Termination of Resuscitation Protocol or transport immediately. (NEW '13)

(2) If shock indicated, defibrillate and resume CPR. Consider Termination of Resuscitation Protocol or transport ASAP. (NEW '13)

(3) If ROSC, transport to a cardiac intervention center via air or ground.

(4) If no ROSC, consider Termination of Resuscitation Protocol or transport to the closest appropriate facility. (NEW '13)



d) Identify rhythm and treat according to appropriate algorithm.

e) If no ROSC, consider Termination of Resuscitation Protocol or transport to the closest appropriate facility. (NEW '13)

f) If ROSC, initiate neuroprotective hypothermia. Transport the patient to the nearest Cardiac Intervention Center by ground as long as the transport time is not more than 30 minutes greater than transport to the nearest ED that can perform neuroprotective hypothermia. Consider helicopter transport for prolonged transports.

g) When indicated and based on the EMS provider's report, the Base Station physician at the receiving Cardiac Intervention Center will activate its Cardiac Intervention Team.



For patients who have not reached their 18th birthday:

h) Identify rhythm and treat according to appropriate algorithm.

i) If no ROSC, transport to the closest appropriate facility.

j) If ROSC, transport the patient to Children's National Medical Center or Johns Hopkins Children's Center by ground or medevac. If arrival time is greater than 30 minutes to either of these destinations, transport to the closest appropriate ED.

F. PRONOUNCEMENT OF DEATH IN THE FIELD (NEW '13)

1. PURPOSE



This protocol is designed to guide the EMS provider in pronouncing death in the field.

Health General Article §5-202 provides that:

- (a) An individual is dead if, based on ordinary standards of medical practice, the individual has sustained either:
 - (1) Irreversible cessation of circulatory and respiratory functions; or
 - (2) Irreversible cessation of all functions of the entire brain, including the brain stem.

2. INDICATIONS

EMS providers may pronounce the death of a patient when one or more of the following criteria has been met.

- a) Decapitation
- b) Rigor mortis
- c) Decomposition
- d) Dependent lividity
- e)  Pulseless, apneic patient in a multi-casualty incident where system resources are required for the stabilization of living patients.
- f)  Pulseless, apneic patient with an injury not compatible with life (with the exception of an obviously pregnant female where resuscitation attempts should be initiated and the patient transported to the nearest appropriate facility)
- g) The EMS provider has terminated resuscitation per the Termination of Resuscitation protocol.

3. PROCEDURE

- a) Confirm that the patient is unresponsive, pulseless, and apneic.
- b) The patient who meets criteria in 2.e may be “black” tagged during triage (by a BLS or ALS provider), but, asystole must be confirmed by ALS provider before a formal pronouncement of death.
- c) The patient who meets criteria in 2.f must be confirmed to be in asystole by ALS provider before a formal pronouncement of death. If the condition of the remains precludes obtaining a cardiac rhythm to confirm asystole (e.g. incineration, severe disruption of the torso, etc.), this must be documented on the patient care report.
- d) Document the exact time and location of the pronouncement of death.
- e) Notify law enforcement and follow local jurisdictional policies or, if death is pronounced during transport, deliver patient to emergency department and follow hospital policies.

G. TERMINATION OF RESUSCITATION (Medical and Traumatic) (NEW '13)



IF ANY DOUBT EXISTS, INITIATE RESUSCITATION AND TRANSPORT

1. PURPOSE


This protocol is designed to guide the provider in determining a futile resuscitation and managing the patient after this determination.

2. PROCEDURE


(a) Exclusions to this protocol.

- (1) If arrest is believed to be secondary to hypothermia or submersion, treat according to appropriate protocol and transport to the nearest appropriate facility.
- (2) If patient is pregnant, treat according to appropriate protocol and transport to the nearest appropriate facility.
- (3) If patient has not reached their 18th birthday, treat according to appropriate protocol and transport to the nearest appropriate facility.

b) Medical Arrest

- (1) EMS providers may terminate resuscitation without medical consult when all three criteria are met.
 - a. The arrest was not witnessed by an EMS provider (and patient is unresponsive, pulseless, and apneic). **AND**
 - b. There is no shockable rhythm identified by an AED or there is asystole or PEA on a manual cardiac monitor. **AND**
 - c. There is no return of spontaneous circulation (ROSC) prior to decision to terminate resuscitation despite appropriate field EMS treatment that includes **15 minutes** of minimally-interrupted EMS CPR. **OR**
- (2)  EMS providers may terminate resuscitation with medical consult when there is no ROSC prior to decision to terminate resuscitation despite appropriate field EMS treatment that includes 15 minutes of minimally-interrupted CPR in the presence of an arrest witnessed by an EMS provider or the presence of a shockable rhythm.

c) Trauma Arrest

- (1) EMS providers may terminate resuscitation without medical consult when both criteria are met. (If medical etiology is suspected, use "Medical Arrest" above.)
 - a. There are no signs of life. **AND**
 - b. The patient is in asystole. **OR**
- (2)  EMS providers may terminate resuscitation with medical consult when both criteria are met in either blunt or penetrating trauma.
 - a. Blunt
 - i. There are no signs of life. **AND**
 - ii. The patient is in a rhythm other than asystole and there is no ROSC despite 15 minutes of appropriate treatment which includes 15 minutes of minimally-interrupted CPR.

**G. TERMINATION OF RESUSCITATION (Medical and Traumatic)
(Continued)**

b. Penetrating

i. There are no signs of life. **AND**

ii. The patient is in a rhythm other than asystole and there is no ROSC.
If less than 15 minutes from a trauma center, transport the patient. If
transport time exceeds 15 minutes, consult.



THERE ARE SOME CAUSES OF TRAUMATIC CARDIOPULMONARY ARREST (I.E. PENETRATING TRAUMA) THAT MAY BE REVERSED IF APPROPRIATELY AND EMERGENTLY MANAGED. THEREFORE, EMS PROVIDERS SHOULD FOLLOW APPROPRIATE PROTOCOLS FOR TRAUMATIC ARREST INCLUDING APPROPRIATE AIRWAY MANAGEMENT AND CONSIDERATION FOR BILATERAL NEEDLE DECOMPRESSION THORACOSTOMY. HOWEVER, EVEN WITH THE APPLICATION OF THESE MANEUVERS, ASYSTOLE AND PULSELESSNESS FOR GREATER THAN 10 MINUTES ARE INDEPENDENT PREDICTORS OF MORTALITY.

d) Pronouncement of Death in the Field protocol.